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ABSTRACT

The Model Secondary School for the Deaf is exploring research areas in which computer-assisted instruction (CAI) plays a major role. Research in the area of learning styles and strategies of deaf adolescents is being aided by CAI data gathering systems. Also under investigation is the use of CAI and visual thinking for deaf adolescents. Curriculum design and development is facilitated by using CAI to determine instructional strategies for various learning tasks. The TICCIT system has been used to provide learner controlled instruction. Many questions concerning the use of the computer for communications are being explored. Finally, questions directly pertaining to the use of computers in instruction are proposed for future research. (CH)

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A RESEARCH AGENDA FOR THE MODEL SECONDARY SCHOOL FOR THE DEAF TICCIT SYSTEM

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A RESEARCH AGENDA FOR THE MODEL SECONDARY SCHOOL FOR THE DEAF TICCIT SYSTEM

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This paper will hopefully serve several purposes. First of all, it will let you know how the Model Secondary School For The Deaf (MSSD) plans to use its new CAI system as a research tool. Second, we hope that your reactions to this paper will serve to provide additional input into our planning process. Your comments about other research problems, parallel research programs, and relevant research findings of which we may be unaware will serve as valuable input into our program. Finally, we hope that this session and paper will facilitate the sharing of research plans and results relating to Computer Assisted Instruction and the deaf. This last goal is perhaps the most difficult to accomplish and yet, at the same time, could be the most beneficial.

There are currently four major areas that we at the MSSD are anxious to explore. These include a series of questions in the area of human learning, questions concerning curriculum and instructional design/development, questions in the area of communications via computer, and finally questions directly pertaining to the use of the computer in instruction. The rest of the paper will develop these areas in greater detail.

Questions About Learning

A lot has been happening recently in the area of applied learning research that has direct implications for instruction. An example is the area of questions inserted in text which have been shown to have a facilitative effect on comprehension and retention of material. A recent review of the literature in this area (Anderson and Biddle, 1976) has pointed out that the time that the questions are inserted and the types of questions that are inserted determine the amount of impact that the questions will have. We would like to determine if the current findings can be generalized to the deaf adolescent population. We plan to use our CAI system as a data gathering tool to answer this question.

Another area of concern centers on learning styles and strategies of deaf adolescents. Elliott (1975) recently used a CAI system as a data gathering instrument to determine adult learning styles and strategies. We are considering a similiar study at the MSSD to determine from observational data if deaf adolescents have a distinctive or characteristic manner of approaching a learning task and to determine to what extent some styles may be more effective than others. This could allow us to train students in the use of the most effective learning styles and, therefore, increase their ability to function effectively independent of a structured learning environment.

There is also theory building occurring in a field called Imagetics. Basically, this concept is that visual thinking is more efficient and productive for a certain range of cognitive tasks and that people

can be trained to become visual thinkers. Some exploratory research has occurred and the tentative findings are very encouraging. The question we have asked is "what would be the impact of training in visual thinking for deaf adolescents?" Since a high proportion of deaf adolescents have language difficulties, would such training provide ways of dealing with information that are not language based. The procedure would include the presentation of a graphical outline of some body of knowledge by way of a CAI terminal. The screen would then be erased and the student would be asked to reconstruct that graphical representation using a light pen. The computer would "read" what the student drew but would not display what was drawn back to the student. This would force the student to conceptually remember the graphical outline and to internalize the visual cues necessary to reconstruct the image. Hypothetically, this procedure should facilitate learning of the material.

Other areas of human learning might also be explored in the future. These include variables such as locus of control, knowledge of results, and advance organizers. Research that we would do in these areas would generally be replications of studies performed on hearing populations in order to determine whether or not the results can be generalized to deaf adolescents. Such research would feed directly into the curriculum development process.

Questions On Curriculum

One of the problems we often face during curriculum development is the establishment of the most appropriate hierarchy for a particular domain of knowledge. Such a hierarchy can be based on

the structure of the subject matter itself or it can be dependent on the conceptual framework with which a student approaches the learning task. One way to determine which approach is more effective would be to enter prototype materials covering a particular learning task into the computer. It could be presented to various students in different arrangements, some based on a conceptual analysis of the content and some based on the students needs as perceived by the developer or as stated by the student. Allowing different students to go through these different hierarchies would allow for empirical determination of which hierarchy was most appropriate. It could also lead to the conclusion that different people learn better from different hierarchies. If this was the case, then CAI would become a perfect medium for presenting such material.

Another interesting curricular use of CAI would be to determine appropriate instructional strategies for various learning tasks. Merrill and Boutwell (1973) have emphasized that instructional strategy is independent of content. For this reason, a decision was made to develop the TICCIT system around a learner controlled format. The MSSD CAI system is an adaptation of TICCIT and will allow for both learner controlled and fixed instructional strategies. We will explore the question of the advantages of each of these approaches. Hypothetically, the learner controlled strategy should lead to more independent learners. However, few people are prepared to act independently during a learning task. One hypothesis could be that people are more effective in a learner controlled environment if they are slowly weaned away from a structured learning environment. This is just one example of a whole series of questions that could be asked concerning instructional strategies.

Another curricular use of CAI would be for the formative evaluation of newly developed instructional materials. The plans at MSSD currently are to enter prototype materials into the CAI system, even when the final format will not be CAI. This will allow for close observation of student performance during the pilot testing of the materials. The amount of time spent, the correct and the incorrect responses that a student makes, and where and how often a student requests help could all be recorded automatically by the computer. This information would be fed back into the development process in order to help the instructional designer refine the product.

Questions Concerning The Use Of The Computer For Communications

Watson (1975) has described in some detail the capabilities of the MSSD CAI system. The communication aspects of the system include a cable video distribution system, inter-terminal communications via video phones, inter-terminal communications via typing (a TTY function) and a message box system. We will be asking questions such as the following concerning the communications capabilities of the system: What is the impact of an enriched visual environment within the MSSD? When do students request particular video programming? What types of video programming are most popular? Do video phones facilitate communications in a school for the deaf?

Questions Concerning The Use Of Computers In Instruction

We have a number of issues that we want to evaluate in this area. One issue concerns the most efficient way to approach development for CAI. Is mainline instruction more cost effective then supplementary instruction? Is CMI more cost effective then CAI? The latter issue has been addressed by the CAISMS project (Computer Assisted Instruction Study Management System) at the University of Illinois. Preliminary results from this project showed significant cognitive gain using CAI to insert questions into existing instructional materials. The developmental costs for the system were far below those for more traditional CAI.

Another question focuses on the appropriateness of various languages for the development of CAI. Our system will have the TICCIT authoring language, PILOT, and BASIC available on it. In addition, through a direct connection to the Gallaudet PDP 10, GNOSIS will also be available. What are the advantages and disadvantages of each of these languages? We will attempt to systematically evaluate this.

Other questions fall in the domain of student - computer interface. How usable is the TICCIT terminal for deaf adolescents? What response modes are most useful: multiple choice, generated response, light pen, etc? Will it be useful to automatically adjust audio level dependent on the individual student's hearing loss?

These have been areas of research that we at the MSSD are interested in pursuing. We are throwing them out for your reaction in

their preliminary form. We would appreciate any input that you might have so that we can consider it as we refine our thoughts and prioritize our research projects.